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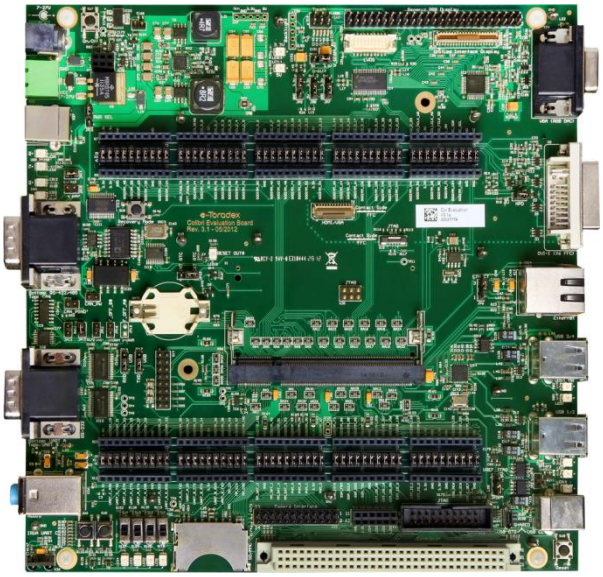
Colibri Evaluation Board

Datasheet



Revision History

Date	Doc. Rev.	Board Version	Changes
11-Sept-12	Rev. 0.9	V3.1	Preliminary Release
02-Oct-12	Rev. 1.0	V3.1	Added JTAG voltage warning in Section 3.8
09-Jan-13	Rev. 1.1	V3.1	Updated links to Toradex websites
23-Aug-13	Rev. 1.2	V3.1	- In the section 3.12.1 on page 33 the connector X21 is female and not male. - In the section 3.18.1 on page 38 the connector designator is X33. - In the section 3.18.3 on page 38 the connector designator is X37. - In the section 4.1 on page 39 the signals SODIMM_64 to SODIMM_70 have been modified with the correct values of the external connector X20. - In the section 3.6.5 the pins from 7 to 11 have been modified with the correct signal name.
03-Dec-2013	Rev. 1.3	V3.1	- In the section 3.6.5 on page 20 and 21, added color mapping (24bpp) data and notes. - In the section 3.6.8 on page 23, added color mapping (18bpp) data.
26-May-2014	Rev. 1.4	V3.1	- Section 1.2.8, Quick-Start Instructions: section name changed to Quick-Start Instructions from Installation. Minor corrections. - Section 3.20, Real-Time Clock (RTC): added section for RTC and Jumper (JP23) setting details.
12-June-2014	Rev. 1.5	V3.1	- Section 3.14, 2xRS232 (X25): added comments/remarks for pins U1, U4, U6, and U9 in the table.
23-Sept-2014	Rev. 1.6	V3.1	- Section 1.1.2, Colibri modules migration and compatibility guide: added Colibri Compatibility Guide download link. - Section 3.6.5, Generic Display (X20): Brief description about the Generic Display connector X20 has been added. Color mapping details have been modified in the table.
14-Oct-2014	Rev. 1.7	V3.2	- Section 2, Colibri Evaluation Board Physical Drawings: Fig. 2 and Fig. 3 have been updated. Connector X38 details have been added in the table. - Section 3.2, CAN: connector X38, jumper connectors JP4 and JP5 details have been added. - Section 3.11, Ethernet: jumper connector JP3 details have been added. - Section 3.13, Parallel Camera Interface: connector X22 pin-out details have been modified in the table. Notes have been added regarding Colibri Evaluation board V3.2 compatibility issue with Colibri Evaluation Board V3.1 and Analogue Camera Module (ACM) V1.1. - Section 3.16, USB to Serial Connector: jumpers JP20 and JP21 details have been added. - Section 5, PCB Revision: PCB revision details have been added.

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1. Introduction

The Colibri Evaluation Board is designed to be a flexible development environment to explore the functionality and performance of the Colibri product family, and includes support for the additional/enhanced functionality on the Colibri T20 and Colibri T30, the Toradex modules which feature the NVIDIA® Tegra™ 2 and Tegra 3 processors.

1.1. Reference Documents

For detailed technical information about suitable computer modules, please refer to the documents listed below.

1.1.1 Colibri Computer Modules

An overview of the Colibri product family:

http://www.toradex.com/products/colibri-arm-modules/colibri-arm-computer-modules

1.1.2 Colibri modules migration and compatibility guide

http://docs.toradex.com/100188-colibri-migration-and-design-guide.pdf

http://docs.toradex.com/102216-colibri-compatibility-guide.xlsx

1.1.3 Pushbutton On/Off controller datasheet

http://cds.linear.com/docs/Datasheet/2954fb.pdf

1.1.4 USB Hub datasheet

http://www.smsc.com/media/Downloads_Public/Data_Sheets/251xb.pdf

1.2. Features

1.2.1 Overview

The Colibri Evaluation Board provides the following features and communication interfaces:

- 4x USB 2.0 port through on board USB Hub
- USB 2.0 OTG Micro-AB connectors for host and host/client
- USB Client Type B port (shared with the OTG)
- USB Type B port (optionally connected to FF UART via USB to serial converter)
- RJ45 Ethernet (10/100 Mbit)
- SD/MMC 4 bit
- Digital (TDMS) and Analog (VGA) interfaces on a single DVI-I connector
- Analog VGA interface on a 15 way D-type connector
- Single channel LVDS interface (up to 24 bit colour)
- Digital RGB interface (up to 24 bit colour)
- Unified TFT Interface with built in resistive touch for direct LCD panel connection
- Audio I/O on 3.5mm stereo jacks
- 2x RS232 Serial Interfaces
- IrDA
- 1x RS422/485 Serial Interface
- I2C, SPI, PWM, Analog inputs
- 1x CAN 2.0B Interface (up to 1Mbit/s)
- Real-time clock with battery backup

- Resistive touch screen connector
- LEDs and Switches
- CPU Bus available on a connector
- Extremely Flexible and easy to use GPIO breakout and jumper area allowing easy signal re-routing, external connection and measurement/probing
- JTAG
- Parallel Camera Interface

1.2.2 User Interface

The Colibri Evaluation Board provides an analog VGA connector to attach a standard computer monitor.

It also provides HDMI/VGA video output through a DVI-I connector for those Colibri modules which support this feature.

LCD panels can be directly connected through the digital RGB interface port. Since there is no standard connector for LCD panels, users usually need to build their own connector interface which attaches to the generic display header provided by the Evaluation Board. To simplify the connection of certain LCD panels, there is also a dedicated connector for the EDT Unified TFT Interface on board. This Interface has a built in resistive touch on the same connector. A variety of LCD panels with integrated touch support for evaluation purposes are available from the Toradex Webshop.

The Colibri Evaluation Board also features a single channel LVDS interface for direct connection of LCD panels which support 18/24bit, single channel LVDS interfaces.

Furthermore the Colibri Evaluation Board provides switches, buttons and LEDs for simple user interaction.

Audio input and output is available on standard 3.5mm jacks.

1.2.3 Communication

Commonly used communication functions are fully implemented on the Colibri Evaluation Board and include: 10/100Mb Ethernet, 4x USB 2.0 Host through USB On board USB Hub, USB OTG micro AB, 2x RS232, 1x RS485/422, USB to serial UART interface, 1x IrDA serial port, and a CAN 2.0b interface.

For all these communication channels the industry standard connectors are provided on-board. The Parallel Camera Interface provides an easy way for interfacing CMOS and CCD sensors.

An SDCard/MMC socket can be used to add storage devices or additional functions to the system.

1.2.4 GPIO Usage Area

The GPIO breakout and jumper area provides a flexible mechanism for changing the hardware configuration and signal routing for a large number of SODIMM pins, including all of those which are GPIO capable. All the SODIMM pins and the standard function signals are described on the silkscreen in order to allow the user to identify required signals on the connector, without having to reference the board schematics.

This enables the user to:

- Change the factory set mapping of Colibri GPIOs to Evaluation Board functions.
- Disconnect a Colibri GPIO from the standard function on the Evaluation Board, and instead connect it to an external interface or device.

1.2.5 CPU Bus

The entire 16-/32-Bit bus of Colibri modules that support the external system bus is accessible through an extension connector. This offers to the user the possibility to interface custom hardware, such as FPGAs, directly to the system bus. The extension connector also provides both 3.3V and 5V power supplies.

1.2.6 Block Diagram

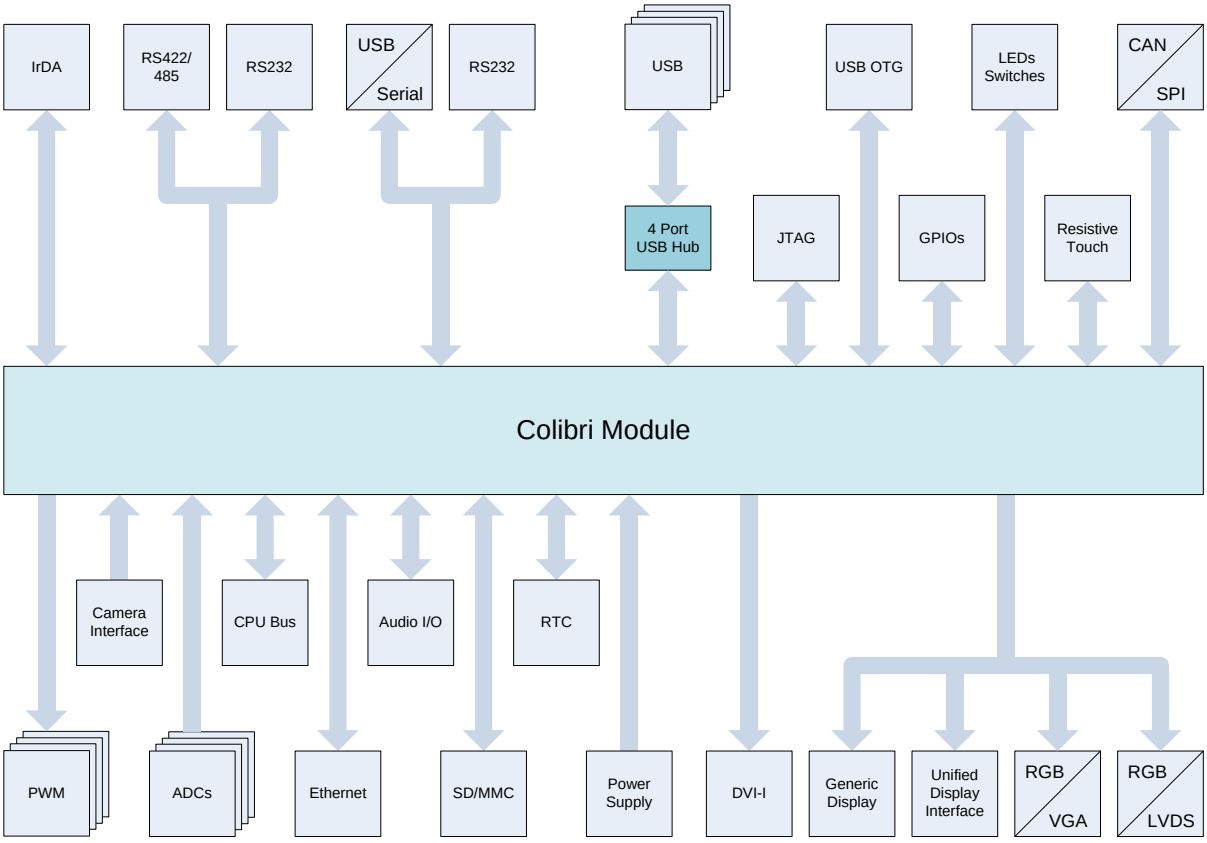


Fig.1 Colibri Evaluation Board Block Diagram

1.2.7 Power Supply

Colibri Evaluation Board has a wide input voltage range of 7-27V DC.

The on-board power supply provides the following supplies (maximum power).

5V / 5A (25W)
3.3V / 5A (16.5W)

The supply is protected against reverse input voltage polarity and short circuits, limiting the maximum current to about 5A. However the protection diode in the input voltage path is thermally not designed to carry that high current, especially at low input voltages. If your application dissipates more than 20W, please consider one of the following:

- Work with a high input voltage, close to 24V
- Add a heat-sink to the polarity protection diode
- Short the polarity protection diode with a wire (removes the reverse polarity protection!)

1.2.8 Quick-Start Instructions

Perform the following steps to quick-start the Colibri Evaluation Board:

1. Insert a Colibri Module in the SODIMM socket X1 on the Colibri Evaluation Board.
2. Plug in a VGA monitor on the corresponding connector X24, a keyboard and a mouse into the available USB host ports.
3. Connect an external power supply to the board by the X33 or X35 connector (7-24V, 3W min, depending on your peripherals).
4. Turn on the external power supply.
5. Push down the power button SW7 on the Colibri Evaluation Board and the preinstalled operating system boots.

For a detailed documentation of the software as well as for the newest bootloader and software images please refer to the Toradex Developer Website: http://developer.toradex.com

2. Colibri Evaluation Board Physical Drawings

2.1. Connector Locations

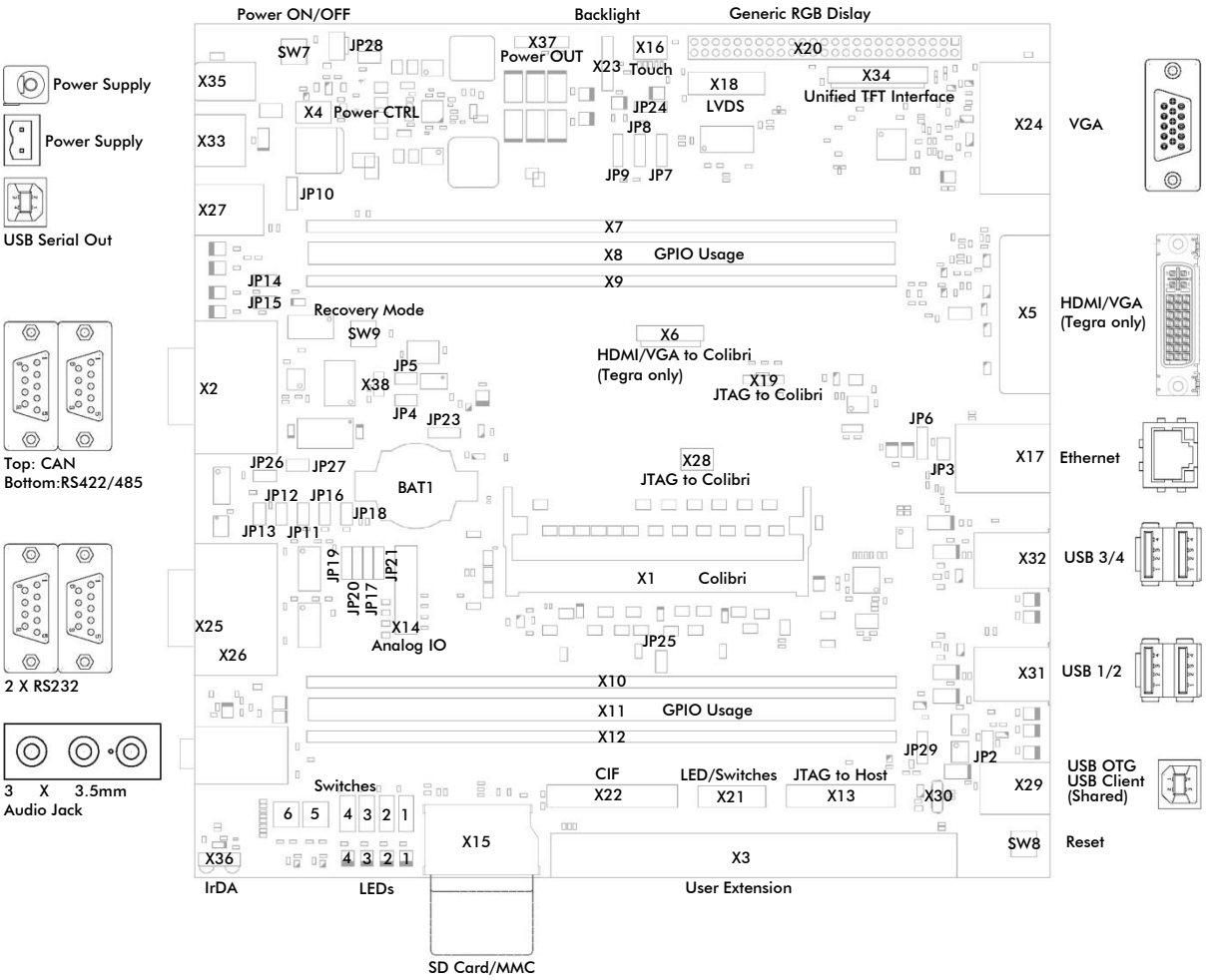


Fig.2 Colibri Evaluation Board connectors – Top Side

Ref	Description	Remarks
X1	Colibri SODIMM	
X2	CAN – RS422/485	
X3	User Extension	
X4	Power CTRL	
X5	HDMI/VGA	Through DVI-I connector, only for modules which support this feature.
X6	HDMI/VGA to Colibri	Only for modules which support this feature
X7	Function Tap	
X8	Jumper Array	
X9	SODIMM breakout area	
X10	SODIMM breakout area	
X11	Jumper Array	
X12	Function Tap	
X13	JTAG to Host	
X14	Analog IO	
X15	SD Card/MMC	
X16	Generic Touch-Screen	
X17	Ethernet	
X18	LVDS	
X19	JTAG to Colibri	
X20	Generic Display	
X21	LED/Switches	
X22	Parallel Camera	
X23	LCD Inverter	
X24	VGA	
X25	2x RS232	
X26	3x Audio Jack	
X27	USB to Serial Connector	
X28	JTAG to Colibri	
X29	USB Client	Shared with the connector X30
X30	USB OTG	Shared with the connector X29
X31	2x USB HOST	Port 1 and 2
X32	2x USB HOST	Port 3 and 4
X33	Power Supply Screw Block Terminal	
X34	Unified TFT Interface	
X35	Power Supply Jack	
X36	IrDA	
X37	Power OUT	
X38	CAN TX/RX	

2.2. Mechanical Drawing

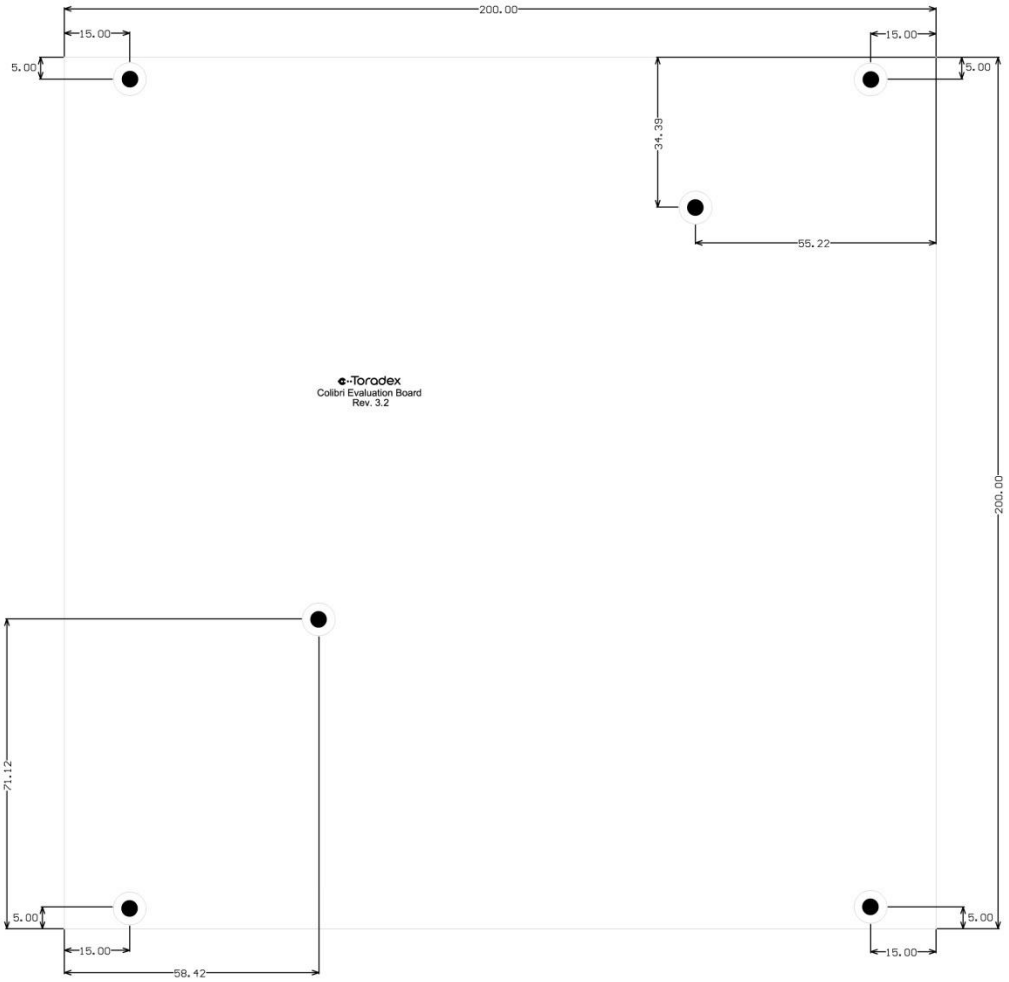


Fig.3 Colibri Evaluation Board Mechanical Drawing – Top Side

3. Colibri Evaluation Board Connectors

3.1. Colibri Module (X1)

Type: SODIMM 200 Socket.

Manufacturer: Tyco Electronics - 1473005-1.

For the pin-out of the Colibri modules please refer to the Colibri Datasheets and Migration Guide for which a link is listed in chapter 1.1.2

Please note, that not all Colibri modules provide the same features (e.g.: the PXA300 does not have audio and touch-screen functionality).

3.2. CAN

The Colibri Evaluation Board uses the Microchip MCP2515T-I/ST controller and the Microchip MCP2551T-I/SN CAN transceiver to implement the CAN 2.0b interface. The CAN port is electrically isolated from the system power supply.

The CAN interface is available on the top part of the connector X2.

The CAN connector provides the ability to optionally connect the isolated power supply to connector pins in order to provide power to external CAN nodes.

Jumper assembled	X2 pin number	Power on X2
JP26	U6	CAN_PGND
JP27	U9	CAN_PW

3.2.1 CAN (X2 - Top)

Type: DSUB9 Male

Pin Nr.	Signal Name	IO Type	Voltage	Pullup/Pulldown
U1	NC	Not connected		
U2	CAN_L	IO	+5V	
U3	CAN_GND	PWR		
U4	NC	Not connected		
U5	NC	Not connected		
U6	CAN_PGND	PWR		
U7	CAN_H	IO	+5V	
U8	NC	Not connected		
U9	CAN_V+	PWR	+5V	

3.2.2 CAN TX/RX (X38)

Colibri VFxx and Colibri iMX6 features on-module CAN interface. This is a module specific feature and may not be supported by all the computer-on-modules in the Colibri family. For more details, refer to the datasheet of Colibri computer-on-modules.

http://developer.toradex.com/hardware-resources/arm-family/colibri-module/can-(controller-area-network)-on-colibri-module

Connector X38 along with jumpers JP4 and JP5, facilitates evaluation/testing of the on-module CAN interface. Jumper JP4 and JP5 are used to connect or disconnect the on-board CAN controller signals with the CAN transceiver.

Jumper	Signal
JP4	CAN_TX
JP5	CAN_RX

In order to test the on-module CAN interface using Colibri Evaluation Board, please use the following hardware configurations:

a) Open circuit jumper JP4 & JP5.
b) Using jumper wires connect the CAN_TX & CAN_RX signals from Colibri module (using GPIO breakout connector) to the connector X38 respectively.
c) CAN transceiver output is available on the top part of the connector X2.

Type: 1x2Pin Female, 2.54mm

Pin Nr.	Signal Name	IO Type	Voltage	Pullup/Pulldown
1	CAN_TX	O	+3.3V	
2	CAN_RX	I	+3.3V	

3.3. RS422/485

The RS422/485 interface is implemented using the Analog Devices ADM3491ARZ transceiver.

The RS422/485 interface is connected to BT UART of the Colibri Module. This UART port is shared with the RS232 transceiver.

The jumpers JP11, JP12, JP13, JP14, JP15, JP16 provide hardware configuration for this interface:

Jumper	Status	Function
JP11	CLOSED	ECHO disabled (the sender cannot read the message just sent)
JP12, JP14	CLOSED	Insert the 120ohm bus termination (for RS422)
JP13, JP15	OPEN	Full Duplex Configuration
JP16	CLOSED	The upper RS232 is disable

3.3.1 RS422/485 (X2 - Bottom)

Type: DSUB9 Male

Pin Nr.	Signal Name	IO Type	Voltage	Pullup/Pulldown
L1	GND	PWR		
L2	NC	Not connected		
L3	NC	Not connected		
L4	RXD+	IO		
L5	RXD-	IO		
L6	NC	Not connected		
L7	NC	Not connected		
L8	TXD+	IO		
L9	TXD-	IO		

3.4. User Extension

The User extension connector provides the CPU bus and a power supply for additional external Hardware.

3.4.1 User Extension (X3)

Type: DIN41612 96Pin Female

Pin Nr.	Signal Name	IO Type	Voltage	Pullup/Pulldown
A1	DATA_0	IO	+3V3	
A2	DATA_3	IO	+3V3	
A3	DATA_5	IO	+3V3	
A4	DATA_8	IO	+3V3	
A5	DATA_11	IO	+3V3	
A6	DATA_13	IO	+3V3	
A7	DATA_16	IO	+3V3	
A8	DATA_19	IO	+3V3	
A9	DATA_21	IO	+3V3	
A10	DATA_24	IO	+3V3	
A11	DATA_27	IO	+3V3	
A12	DATA_29	IO	+3V3	
A13	+3V3	PWR	+3V3	
A14	ADDR_0	O	+3V3	
A15	ADDR_3	O	+3V3	
A16	ADDR_6	O	+3V3	
A17	ADDR_8	O	+3V3	
A18	ADDR_11	O	+3V3	
A19	ADDR_14	O	+3V3	
A20	ADDR_16	O	+3V3	
A21	ADDR_19	O	+3V3	
A22	ADDR_22	O	+3V3	
A23	ADDR_24	O	+3V3	
A24	DQM1	O	+3V3	
A25	+5V	PWR	+5V	
A26	WE#	I	+3V3	
A27	EXT_CS_0#	I	+3V3	100k to +3V3
A28	RD_WR#	I	+3V3	
A29	I2C_SDA	IO	+3V3	4k7 to +3V3
A30	SSP_FRM	IO	+3V3	
A31	PWE#	I	+3V3	
A32	EXT_IO_1	I	+3V3	
B1	DATA_1	IO	+3V3	
B2	GND	PWR		
B3	DATA_6	IO	+3V3	
B4	DATA_9	IO	+3V3	
B5	+3V3	PWR		
B6	DATA_14	IO	+3V3	

Pin Nr.	Signal Name	IO Type	Voltage	Pullup/Pulldown
B7	DATA_17	IO	+3V3	
B8	+3V3	PWR		
B9	DATA_22	IO	+3V3	
B10	DATA_25	IO	+3V3	
B11	+3V3	PWR		
B12	DATA_30	IO	+3V3	
B13	GND	PWR		
B14	ADDR_1	O	+3V3	
B15	ADDR_4	O	+3V3	
B16	GND	PWR		
B17	ADDR_9	O	+3V3	
B18	ADDR_12	O	+3V3	
B19	+5V	PWR		
B20	ADDR_17	O	+3V3	
B21	ADDR_20	O	+3V3	
B22	GND	PWR		
B23	ADDR_25	O	+3V3	
B24	DQM_2	O	+3V3	
B25	GND	PWR		
B26	EXT_CS_1#	IO	+3V3	100k to +3V3
B27	GND	PWR		
B28	RDY	IO	+3V3	
B29	+5V	PWR		
B30	SSP_TXD	O	+3V3	
B31	GND	PWR		
B32	RESET_OUT#	O	+3V3	
C1	DATA_2	IO	+3V3	
C2	DATA_4	IO	+3V3	
C3	DATA_7	IO	+3V3	
C4	DATA_10	IO	+3V3	
C5	DATA_12	IO	+3V3	
C6	DATA_15	IO	+3V3	
C7	DATA_18	IO	+3V3	
C8	DATA_20	IO	+3V3	
C9	DATA_23	IO	+3V3	
C10	DATA_26	IO	+3V3	
C11	DATA_28	IO	+3V3	
C12	DATA_31	IO	+3V3	
C13	+3V3	PWR		
C14	ADDR_2	O	+3V3	
C15	ADDR_5	O	+3V3	
C16	ADDR_7	O	+3V3	
C17	ADDR_10	O	+3V3	
C18	ADDR_13	O	+3V3	

Pin Nr.	Signal Name	IO Type	Voltage	Pullup/Pulldown
C19	ADDR_15	O	+3V3	
C20	ADDR_18	O	+3V3	
C21	ADDR_21	O	+3V3	
C22	ADDR_23	O	+3V3	
C23	DQM_0	O	+3V3	
C24	DQM_3	O	+3V3	
C25	+5V	PWR		
C26	OE#	O	+3V3	
C27	EXT_CS_2#	IO	+3V3	100k to +3V3
C28	I2C_SCL	IO	+3V3	4k7 to +3V3
C29	SSP_SCLK	IO	+3V3	
C30	SSP_RXD	I	+3V3	
C31	EXT_IO_0	IO	+3V3	
C32	EXT_IO_2	IO	+3V3	

3.5. Power CTRL

Power control of the Colibri Evaluation Board is implemented using the Linear LTC2954 Pushbutton On/Off controller.

For further information about the signals provided by this controller please refer to the datasheet.

The Power CTRL connector X4 provides the Reset and Power Button control signals to be accessed by external logic.

By assembling the Jumper JP28 it is possible to obtain an “Always On” behaviour: the Colibri Evaluation Board will start without waiting for the Power On button to be pushed.

In addition the pin 3 of the connector X4 can be used in order to override the Pushbutton controller. The following table shows the behaviour of the board according to the level of the PWR_CTRL signal:

PWR_CTRL Level	Function
0V	The Pushbutton controller is working normally
3.3V	The Colibri Evaluation Board is Always On when power is applied

3.5.1 Power CTRL (X4)

Type: 2 x 3Pin Header Female, 2.54mm

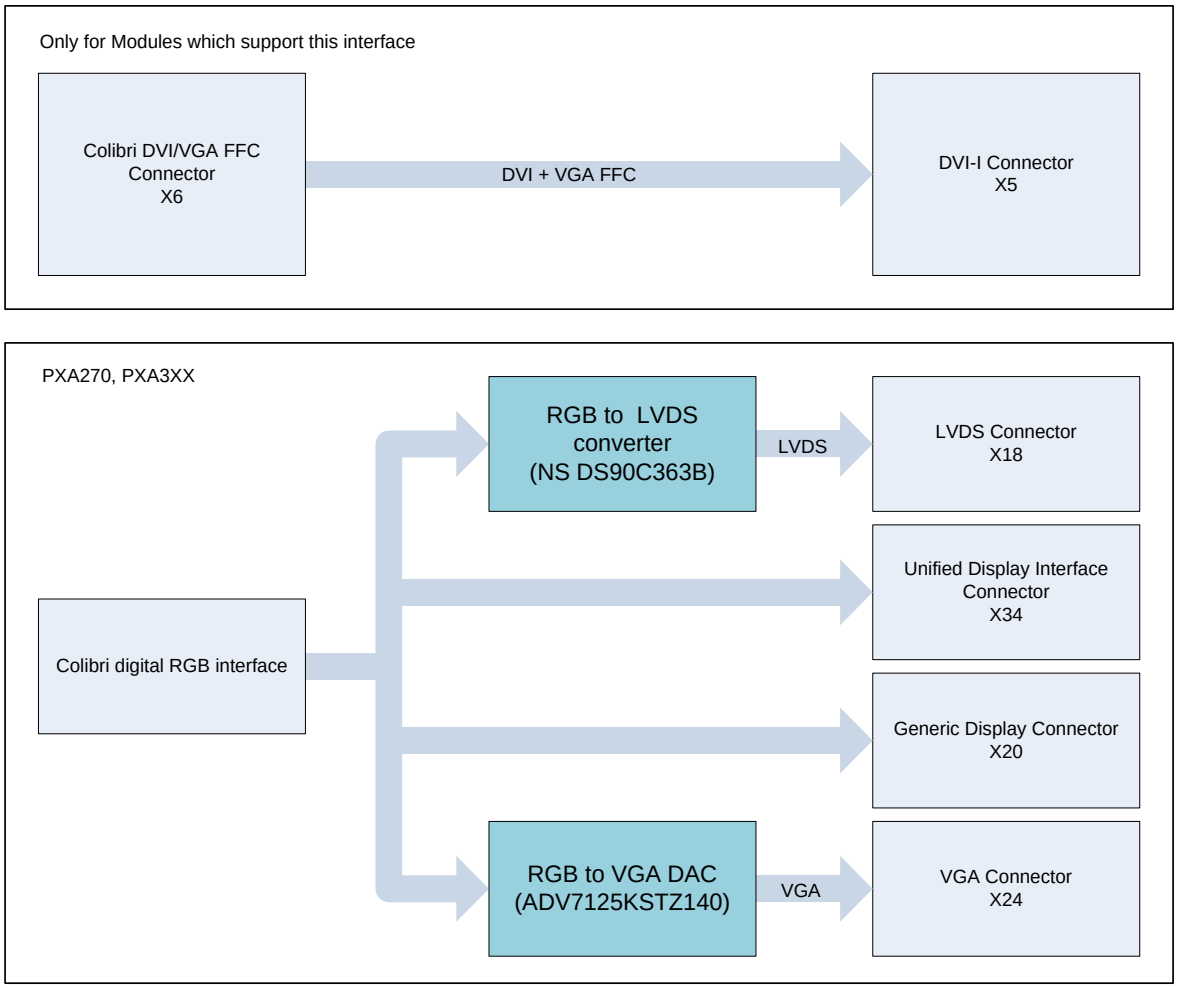
Pin Nr.	Signal Name	IO Type	Voltage	Pullup/Pulldown
1	PWRBTN1	I		PU 100K to 1.9V
2	GND	PWR		
3	PWR_CTRL	I	+3.3V max	PD 100K
4	INT#	I		PU 10K TO 3.3V
5	FORCE_OFF#	I		PU 100K TO 3.3V
6	RESET_EXT#	IO	+3V3	PU to +33V

3.6. Display

The Colibri Evaluation Board provides many options for connecting LCD panels and monitors, with the following four interfaces supported:

- 18/24 bit digital RGB (depending on the installed Colibri module)
- Single channel LVDS
- DVI-I (Digital TDMS and Analog VGA, depending on the installed Colibri module)
- VGA

The following image shows the Display interface architecture that has been implemented:



Almost any TFT or STN display can be connected to the LCD port of the Colibri module by simply connecting the necessary signals from connectors X16 and X20 (which provide standard 2.54mm pitch) to the display.

Toradex provides a range of different tools and utilities to help with the easy configuration of different LCD panels. For details please refer to: http:/developer.toradex.com

3.6.1 DVI-I Connector (X5)

Pin	Description	I/O Type	Voltage	Pull-up/Pull-down
1	TMDS_DATA2_N	I		
2	TMDS_DATA2_P	I		
3	GND	PWR		
4	NC			
5	NC			
6	DDC_CLK	I		
7	DDC_DATA	I		
8	CRT_VSYNC	I		
9	TMDS_DATA1_N	I		
10	TMDS_DATA1_P	I		
11	GND	PWR		
12	NC			
13	NC			
14	DVI_5V	PWR	+5V	
15	GND	PWR		
16	HOTPLUG_DETECT	O		
17	TMDS_DATA0_N	I		
18	TMDS_DATA0_P	I		
19	GND	PWR		
20	NC			
21	NC			
22	GND	PWR		
23	TMDS_CLK_P	I		
24	TMDS_CLK_N	I		
C1	CRT_RED	I		
C2	CRT_GREEN	I		
C3	CRT_BLUE	I		
C4	CRT_HSYNC	I		
C5	GND	PWR		

3.6.2 HDMI/VGA to Colibri (X6)

Connector type: Hirose FH12-24S-0.5SV(55)

Pin	Signal Name	I/O Type	Voltage	Pull-up/Pull-down
1	GND	PWR		
2	TMDS_CLK_P	I	+3.3V	
3	TMDS_CLK_N	I	+3.3V	
4	GND	PWR		
5	TMDS_DATA0_P	I	+3.3V	
6	TMDS_DATA0_N	I	+3.3V	
7	GND	PWR		
8	TMDS_DATA1_P	I	+3.3V	
9	TMDS_DATA1_N	I	+3.3V	
10	GND	PWR		

Pin	Signal Name	I/O Type	Voltage	Pull-up/Pull-down
11	TMDS_DATA2_P	I	+3.3V	
12	TMDS_DATA2_N	I	+3.3V	
13	NC			
14	HOTPLUG_DETECT	O	+3.3V	
15	DDC_CLK	I	+5V	1.8KR to +5V
16	DDC_DATA	I	+5V	1.8KR to +5V
17	GND	PWR		
18	CRT_RED	I	+3.3V	
19	GND	PWR		
20	CRT_GREEN	I	+3.3V	
21	GND	PWR		
22	CRT_BLUE	I	+3.3V	
23	CRT_VSYNC	I	+3.3V	
24	CRT_HSYNC	I	+3.3V	

3.6.3 Generic Touch-Screen (X16)

Part number: Samtec TSW-103-07-G-D (Header Male 2x3 2.54mm pitch)

Pin Nr.	Signal Name		IO Type	IO Type	Pullup/Pulldown
1	GND		PWR		
2	TOUCH_TSMY	20	O	+3V3	
3	TOUCH_TSMX	16	O	+3V3	
4	TOUCH_TSPY	18	O	+3V3	
5	TOUCH_TSPX	14	O	+3V3	
6	TOUCH_WIPER	2 (via R95)	O	+3.3V	

3.6.4 LVDS Connector (X18)

Connector type: Hirose DF13A-20DP-1.25v(56)

Pin	Signal Name	Description
1	LVDS_5V	5V power supply pin
2	LVDS_3.3V	3.3V power supply pin
3	GND	
4	SEL1	Connected to LVDS_3.3V or GND via Jumper JP7. The default value is GND
5	LVDS_OUT0_N	The negative LVDS output number 0
6	GND	
7	LVDS_OUT0_P	The positive LVDS output number 0
8	LVDS_OUT1_N	The negative LVDS output number 1
9	GND	
10	LVDS_OUT1_P	The positive LVDS output number 1
11	LVDS_OUT2_N	The negative LVDS output number 2
12	GND	
13	LVDS_OUT2_P	The positive LVDS output number 2
14	LVDS_CLK_N	The negative LVDS clock signal
15	GND	
16	LVDS_CLK_P	The positive LVDS clock signal

Pin	Signal Name	Description
17	BL_ON	Back Light control signal
18	GND	
19	SEL2	Connected to LVDS_5V, LVDS_3.3V or GND via Jumper JP8. The default value is 5V
20	SEL3	Connected to LVDS_3.3V or GND via Jumper JP9. The default value is LVDS_3.3V

3.6.5 Generic Display (X20)

Generic display connector X20 can support up-to 24 bit RGB interface, depending upon the Colibri module installed on the evaluation board. The 18 bit color mapping is compatible with all the computer-on-modules in the Colibri family. For more details please see the relevant Colibri module datasheet.

Part number: Samtec TSW-125-07-G-D (Header Male 2x25 2.54mm pitch)

Pin Nr.	Signal Name	Color Mapping 18bpp	IO Type	Voltage	Pullup/Pulldown
1	GND		PWR		
2	LCD_PCLK_WR		OI	+3V3	
3	LCD_LCLK_A0		O	+3V3	
4	LCD_FCLK_RD		O	+3V3	
5	GND		PWR	PWR	
6	LCD_D_12	RED 0	O	+3V3	
7	LCD_D_13	RED 1	O	+3V3	
8	LCD_D_14	RED 2	O	+3V3	
9	LCD_D_15	RED 3	O	+3V3	
10	LCD_D_16	RED 4	O	+3V3	
11	LCD_D_17	RED 5	O	+3V3	
12	GND		PWR		
13	LCD_D_6	GREEN 0	O	+3V3	
14	LCD_D_7	GREEN 1	O	+3V3	
15	LCD_D_8	GREEN 2	O	+3V3	
16	LCD_D_9	GREEN 3	O	+3V3	
17	LCD_D_10	GREEN 4	O	+3V3	
18	LCD_D_11	GREEN 5	O	+3V3	
19	GND		PWR		
20	LCD_D_0	BLUE 0	O	+3V3	
21	LCD_D_1	BLUE 1	O	+3V3	
22	LCD_D_2	BLUE 2	O	+3V3	
23	LCD_D_3	BLUE 3	O	+3V3	
24	LCD_D_4	BLUE 4	O	+3V3	
25	LCD_D_5	BLUE 5	O	+3V3	
26	GND		PWR		
27	L_BIAS		I	+3V3	
28	+V_DISPLAY		PWR	JP4 selects +3V3 or +5V	
29	+V_DISPLAY		PWR	JP4 selects +3V3 or +5V	
30	TP9		IO		
31	P10		IO		
32	GND		PWR		

Pin Nr.	Signal Name	Color Mapping 18bpp	IO Type	Voltage	Pullup/Pulldown
33	TOUCH_TSMY		O		
34	TOUCH_TSMX		O		
35	TOUCH_TSPY		O		
36	TOUCH_TSPX		O		
37	BL_ON		O	+3V3	100k to GND
38	GND_DISPINV		PWR		
39	5V_DISPINV		PWR	+5V	
40	GND_DISPINV		PWR		
41	GND		PWR		
42	GND		PWR		
43	LCD_D_22		O	+3V3	
44	LCD_D_23		O	+3V3	
45	LCD_D_20		O	+3V3	
46	LCD_D_21		O	+3V3	
47	LCD_D_18		O	+3V3	
48	LCD_D_19		O	+3V3	
49	3.3V_DISP		PWR		
50	TOUCH_WIPER		O		

3.6.6 LCD Inverter (X23)

Part number: 3M 961105-6404-AR (Header Male 1x5 2.54mm pitch)

Pin Nr.	Signal Name	IO Type	Voltage	Pullup/Pulldown
1	5V_DISPINV	PWR	+5V	
2	GND_DISPINV	PWR		
3	BL_ON	O	+3V3	100k to GND
4	GND_DISPINV	PWR		
5	NC	Not connected		

3.6.7 VGA (X24)

Type: High Density DSUB15

Pin Nr.	Signal Name	IO Type	Voltage	Pullup/Pulldown
1	EXT_RED	O		
2	EXT_GREEN	O		
3	EXT_BLUE	O		
4	NC	Not connected		
5	GND	PWR		
6	GND	PWR		
7	GND	PWR		
8	GND	PWR		
9	GND	PWR		
10	GND	PWR		
11	NC	Not connected		
12	NC	Not connected		
13	EXT_HSYNC	O	+5V	

Pin Nr.	Signal Name	IO Type	Voltage	Pullup/Pulldown
14	EXT_VSYNC	O	+5V	
15	NC	Not connected		

3.6.8 Unified TFT Interface (X34)

This RGB display interface uses the EDT Unified TFT Display Interface pin out, for which there are a wide variety of displays of different sizes and resolutions available. These displays are connected to the Colibri Evaluation Board directly via a 40 way FFC.

The EDT Unified TFT Interface also features a resistive touch screen interface on the same FFC, providing support for displays which have integrated touch.

For further information about this interface and the available LCD panels, please refer to the Toradex developer website:

http://developer.toradex.com/knowledge-base/edt-unified-interface-display-family

Connector type: Hirose FH12-40S-0.5SV(55)

Pin	Signal Name	Color Mapping 18bpp	I/O Type	Voltage
1	GND		PWR	
2	GND		PWR	
3	+3.3V		PWR	+3.3V
4	+3.3V		PWR	+3.3V
5	BL_ON		O	+3.3V
6	PWM_A		O	+3.3V
7	RESET_OUT#		O	+3.3V
8	LCD_D_5	BLUE 5	O	+3.3V
9	LCD_D_4	BLUE 4	O	+3.3V
10	LCD_D_3	BLUE 3	O	+3.3V
11	LCD_D_2	BLUE 2	O	+3.3V
12	LCD_D_1	BLUE 1	O	+3.3V
13	LCD_D_0	BLUE 0	O	+3.3V
14	GND		PWR	
15	LCD_D_11	GREEN 5	O	+3.3V
16	LCD_D_10	GREEN 4	O	+3.3V
17	LCD_D_9	GREEN 3	O	+3.3V
18	LCD_D_8	GREEN 2	O	+3.3V
19	LCD_D_7	GREEN 1	O	+3.3V
20	LCD_D_6	GREEN 0	O	+3.3V
21	GND		PWR	
22	LCD_D_17	RED 5	O	+3.3V
23	LCD_D_16	RED 4	O	+3.3V
24	LCD_D_15	RED 3	O	+3.3V
25	LCD_D_14	RED 2	O	+3.3V
26	LCD_D_13	RED 1	O	+3.3V
27	LCD_D_12	RED 0	O	+3.3V
28	LCD_PCLK_WR		O	+3.3V
29	GND		PWR	
30	LCD_LCLK_A0		O	+3.3V
31	LCD_FCLK_RD		O	+3.3V
32	LCD_BIAS		O	+3.3V
33	Connected to 3.3V or GND via assembly option. The default assembly is GND		O	+3.3V/GND
34	Connected to 3.3V or GND via assembly option. The default assembly is GND		O	+3.3V/GND
35	GND		PWR	
36	+3.3V		PWR	+3.3V
37	TOUCH_TSPY		O	+3.3V
38	TOUCH_TSMX		O	+3.3V
39	TOUCH_TSMY		O	+3.3V
40	TOUCH_TSPX		O	+3.3V

3.7. GPIO Usage

The GPIO breakout connectors offer the flexibility to map the GPIOs of the Colibri module to either the on-board function or to external hardware.

The factory setting is a straight through jumper setting, meaning that the X8-A row is connected straight to the X8-B row. This is also true for the connector X11.

To allowing easy measurement, probing, and re-routing, all signals residing on the male header are also available on a female connector in parallel.

To map SODIMM ping with the corresponding GPIO numbers which are specific to individual Colibri modules, please refer to the Migration Guide (see chapter 1.1.2).

3.7.1 GPIO 1 Male (X8 Row A)

Type: 2x50Pin Male, 2.54mm

Pin Nr.	Signal Name	IO Type	Voltage	Pullup/Pulldown
A1	+3V3	PWR	+3V3	
A2	+3V3	PWR	+3V3	
A3	GND	PWR		
A4	SODIMM_45	IO	+3V3	
A5	SODIMM_55	IO	+3V3	
A6	SODIMM_63	IO	+3V3	
A7	SODIMM_100	IO	+3V3	
A8	GND	PWR		
A9	SODIMM_102	IO	+3V3	
A10	SODIMM_104	IO	+3V3	
A11	VDD_FAULT#	IO	+3V3	
A12	BATT_FAULT#	IO	+3V3	
A13	SODIMM_44	IO	+3V3	
A14	SODIMM_76	IO	+3V3	
A15	+3V3	PWR		
A16	SODIMM_70	IO	+3V3	
A17	SODIMM_60	IO	+3V3	
A18	SODIMM_58	IO	+3V3	
A19	SODIMM_78	IO	+3V3	
A20	SODIMM_72	IO	+3V3	
A21	SODIMM_80	IO	+3V3	
A22	GND	PWR		
A23	SODIMM_46	IO	+3V3	
A24	SODIMM_62	IO	+3V3	
A25	SODIMM_48	IO	+3V3	
A26	SODIMM_74	IO	+3V3	
A27	SODIMM_50	IO	+3V3	
A28	SODIMM_52	IO	+3V3	
A29	+3V3	PWR		
A30	SODIMM_54	IO	+3V3	
A31	SODIMM_66	IO	+3V3	
A32	SODIMM_64	IO	+3V3	

Pin Nr.	Signal Name	IO Type	Voltage	Pullup/Pulldown
A33	SODIMM_57	IO	+3V3	
A34	SODIMM_61	IO	+3V3	
A35	SODIMM_136	IO	+3V3	
A36	GND	PWR		
A37	SODIMM_138	IO	+3V3	
A38	SODIMM_140	IO	+3V3	
A39	SODIMM_142	IO	+3V3	
A40	SODIMM_144	IO	+3V3	
A41	SODIMM_146	IO	+3V3	
A42	SODIMM_56	IO	+3V3	
A43	+3V3	PWR		
A44	SODIMM_68	IO	+3V3	
A45	SODIMM_82	IO	+3V3	
A46	SODIMM_71	IO	+3V3	
A47	SODIMM_194	IO	+3V3	
A48	SODIMM_196	IO	+3V3	
A49	GND	PWR		
A50	GND	PWR		

3.7.2 GPIO 1 Female (X9)

Type: 1x50Pin Female, 2.54mm

Pin-out identical to X8 Pins A1 to A50.

3.7.3 Function 1 Male (X8 Row B)

Type: 2x50Pin Male, 2.54mm

Pin Nr.	Signal Name	IO Type	Voltage	Pullup/Pulldown
B1	+3V3	PWR		
B2	+3V3	PWR		
B3	GND	PWR		
B4	SODIMM_45	IO	+3V3	
B5	SODIMM_55	IO	+3V3	
B6	SODIMM_63	IO	+3V3	
B7	SODIMM_100	IO	+3V3	
B8	GND	PWR		
B9	SODIMM_102	IO	+3V3	
B10	SODIMM_104	IO	+3V3	
B11	VDD_FAULT#	IO	+3V3	
B12	BATT_FAULT#	IO	+3V3	
B13	LCD_BIAS	O	+3V3	
B14	LCD_D_0	O	OLV	
B15	+3V3	PWR		
B16	LCD_D_1	O	+3V3	
B17	LCD_D_2	O	+3V3	
B18	LCD_D_3	O	+3V3	

Pin Nr.	Signal Name	IO Type	Voltage	Pullup/Pulldown
B19	LCD_D_4	O	+3V3	
B20	LCD_D_5	O	+3V3	
B21	LCD_D_6	O	+3V3	
B22	GND	PWR		
B23	LCD_D_7	O	+3V3	
B24	LCD_D_8	O	+3V3	
B25	LCD_D_9	O	+3V3	
B26	LCD_D_10	O	+3V3	
B27	LCD_D_11	O	+3V3	
B28	LCD_D_12	O	+3V3	
B29	+3V3	PWR		
B30	LCD_D_13	O	+3V3	
B31	LCD_D_14	O	+3V3	
B32	LCD_D_15	IO	+3V3	
B33	LCD_D_16	IO	+3V3	
B34	LCD_D_17	I	+3V3	
B35	LCD_D_18	O	+3V3	
B36	GND	PWR		
B37	LCD_D_19	O	+3V3	
B38	LCD_D_20	O	+3V3	
B39	LCD_D_21	O	+3V3	
B40	LCD_D_22	I	+3V3	100k to +3V3
B41	LCD_D_23	I	+3V3	100k to +3V3
B42	LCD_PCLK_WR	I	+3V3	100k to +3V3
B43	+3V3	PWR		
B44	LCD_LCLK_AO	O	+3V3	100k to +3V3
B45	LCD_FCLK_RD	IO	+3V3	33k to +3V3
B46	BL_ON	IO	+3V3	68k to +3V3
B47	I2C_SDA	IO	+3V3	4k7 to +3V3
B48	I2C_SCL	IO	+3V3	4k7 to +3V3
B49	GND	PWR		
B50	GND	PWR		

3.7.4 Function 1 Female (X7)

Type: 1x50Pin Female, 2.54mm

Pin-out identical to X8 Pins B1 to B50

3.7.5 Function 2 Male (X11 Row A)

Type: 2x50Pin Male

Pin Nr.	Signal Name	IO Type	Voltage	Pullup/Pulldown
A1	+3V3	PWR		
A2	UART_C_RXD	I	+3V3	
A3	UART_C_TXD	O	+3V3	
A4	UART_A_DTR	O	+3V3	
A5	UART_A _CTS	I	+3V3	
A6	UART_A _RTS	O	+3V3	
A7	UART_A _DSR	I	+3V3	
A8	GND	PWR		
A9	UART_A _DCD	I	+3V3	
A10	UART_A _D_RXD	I	+3V3	
A11	UART_A _D_TXD	O	+3V3	
A12	UART_A _RI	I	+3V3	
A13	UART_B_CTS	I	+3V3	
A14	UART_B_RTS	O	+3V3	
A15	+3V3	PWR		
A16	UART_B_RXD	I	+3V3	
A17	UART_B_TXD	O	+3V3	
A18	MM_CD	I	+3V3	
A19	MM_CLK	O	+3V3	
A20	MM_CMD	I	+3V3	33k to +3V3
A21	MM_DAT_0	IO	+3V3	68k to +3V3
A22	GND	PWR		
A23	MM_DAT_1	IO	+3V3	68k to +3V3
A24	MM_DAT_2	IO	+3V3	68k to +3V3
A25	MM_DAT_3	IO	+3V3	68k to +3V3
A26	PWM_A	O	+3V3	
A27	PWM_B	O	+3V3	RC-filter (3.3ms)
A28	PWM_C	O	+3V3	RC-filter (3.3ms)
A29	+3V3	PWR		
A30	PWM_D	O	+3V3	RC-filter (3.3ms)
A31	CAN_INT#	IO	+3V3	4k7 to +3V3
A32	SSP_FRM	IO	+3V3	
A33	SSP_SCLK	IO	+3V3	
A34	SSP_RXD	I	+3V3	
A35	SSP_TXD	O	+3V3	
A36	GND	PWR		
A37	EXT_CS_0#	O	+3V3	100k to +3V3
A38	EXT_CS_1#	O	+3V3	100k to +3V3
A39	EXT_CS_2#	O	+3V3	100k to +3V3
A40	EXT_IO_0	IO	+3V3	
A41	EXT_IO_1	IO	+3V3	
A42	EXT_IO_2	IO	+3V3	

Pin Nr.	Signal Name	IO Type	Voltage	Pullup/Pulldown
A43	+3V3	PWR		
A44	GND	PWR		
A45	+3V3	PWR		
A46	GND	PWR		
A47	USB_PE#	O	+3V3	100k to GND
A48	USB_OC#	O	+3V3	100k to +3V3
A49	USBC_DET	I	+3V3	
A50	GND	PWR		

3.7.6 Function 2 Female (X12)

Type: 1x50Pin Female, 2.54mm

Pin-out identical to X11 Pins A1 to A50

3.7.7 GPIO 2 Male (X11 Row B)

Type: 2x50Pin Male, 2.54mm

Pin Nr.	Signal Name	IO Type	Voltage	Pullup/Pulldown
B1	+3V3	PWR		
B2	SODIMM_19	IO	+3V3	
B3	SODIMM_21	IO	+3V3	
B4	SODIMM_23	IO	+3V3	
B5	SODIMM_25	IO	+3V3	
B6	SODIMM_27	IO	+3V3	
B7	SODIMM_29	IO	+3V3	
B8	GND	PWR		
B9	SODIMM_31	IO	+3V3	
B10	SODIMM_33	IO	+3V3	
B11	SODIMM_35	IO	+3V3	
B12	SODIMM_37	IO	+3V3	
B13	SODIMM_32	IO	+3V3	
B14	SODIMM_34	IO	+3V3	
B15	+3V3	PWR		
B16	SODIMM_36	IO	+3V3	
B17	SODIMM_38	IO	+3V3	
B18	SODIMM_43	IO	+3V3	
B19	SODIMM_47	IO	+3V3	
B20	SODIMM_190	IO	+3V3	
B21	SODIMM_192	IO	+3V3	
B22	GND	PWR		
B23	SODIMM_49	IO	+3V3	
B24	SODIMM_51	IO	+3V3	
B25	SODIMM_53	IO	+3V3	
B26	SODIMM_59	IO	+3V3	
B27	SODIMM_28	IO	+3V3	
B28	SODIMM_30	IO	+3V3	

Pin Nr.	Signal Name	IO Type	Voltage	Pullup/Pulldown
B29	+3V3	PWR		
B30	SODIMM_67	IO	+3V3	
B31	SODIMM_73	IO	+3V3	
B32	SODIMM_86	IO	+3V3	
B33	SODIMM_88	IO	+3V3	
B34	SODIMM_90	IO	+3V3	
B35	SODIMM_92	IO	+3V3	
B36	GND	PWR		
B37	SODIMM_105	IO	+3V3	
B38	SODIMM_107	IO	+3V3	
B39	SODIMM_106	IO	+3V3	
B40	SODIMM_135	IO	+3V3	
B41	SODIMM_133	IO	+3V3	
B42	SODIMM_127	IO	+3V3	
B43	+3V3	PWR		
B44	GND	PWR		
B45	+3V3	PWR		
B46	GND	PWR		
B47	SODIMM_129	IO	+3V3	
B48	SODIMM_131	IO	+3V3	
B49	SODIMM_137	IO	+3V3	
B50	GND	PWR		

3.7.8 GPIO 2 Female (X10)

Type: 1x50Pin Female, 2.54mm

Pin-out identical to X11 Pins B1 to B50

3.8. JTAG

The Colibri Evaluation Board provides a JTAG interface to the JTAG port available on Colibri modules.

Connector X19 is used to connect to the Colibri module JTAG connector with a flexible flat cable, and X13 provides an interface to an external JTAG device via a standard 2.54mm shrouded and keyed header.

In addition, the Colibri evaluation Board features a spring loaded Pogo-pin connector X28 which is positioned directly underneath the installed Colibri module, allowing direct connection with the Colibri module JTAG test points, removing the need for the JTAG FFC connector.

Different Colibri modules support JTAG interfaces with different voltage levels, and therefore Jumper JP29 must be used to set the correct JTAG voltage reference:

JP29	Active
1 - 2	VREF_JTAG = +1.8V
2 - 3	VREF_JTAG = +3.3V

Please note that, if the voltage is wrong, the module will be damaged!

3.8.1 JTAG to Host (X13)

Type: 2x10Pin Header Male, 2.54mm

Pin Nr.	Signal Name	IO Type	Voltage	Pullup/Pulldown
1	VREF_JTAG	PWR		
2	VREF_JTAG	PWR		
3	JTAG_TRST#	I	+3V3	
4	GND	PWR		
5	JTAG_TDI	I	+3V3	
6	GND	PWR		
7	JTAG_TMS	I	+3V3	
8	GND	PWR		
9	JTAG_TCK	I	+3V3	
10	GND	PWR		
11	NC	Not connected		
12	GND	PWR		
13	JTAG_TDO_R	I	+3V3	
14	GND	PWR		
15	JTAG_SYSRESET#	I	+3V3	
16	GND	PWR		
17	NC	Not connected		
18	GND	PWR		
19	NC	Not connected		
20	GND	PWR		

3.8.2 JTAG to Colibri (X19)

When inserting the Colibri module into the Colibri Evaluation Board please pay attention how you connect the 8 pin FCC cable which is used for the JTAG connection between the Colibri Evaluation Board and the Colibri:

First plug in FCC cable into connector X2 of Colibri module (so the blue coloured supporting tape of the FCC cable is opposite to the Colibri PCB). Secondly, plug the Colibri module into the Colibri Evaluation Board. Finally, plug the FCC cable into connector X19 of Colibri Evaluation Board (the blue coloured supporting tape of the FCC cable is facing towards the Colibri module)

Part number: GCT FFC2A30-08-T-L

Pin Nr.	Signal Name	IO Type	Voltage	Pullup/Pulldown
1	JTAG_SYSRESET#	O	+3V3	-
2	JTAG_TDI	O	+3V3	-
3	JTAG_TDO	I	+3V3	-
4	JTAG_TCK	O	+3V3	-
5	JTAG_TRST#	O	+3V3	-
6	JTAG_TMS	O	+3V3	-
7	GND	PWR		-
8	+3V3	PWR		-

3.8.3 JTAG to Colibri (X28)

Type: Mill-Max 823-22-006-10-000101

Pin Nr.	Signal Name	IO Type	Voltage	Pullup/Pulldown
1	JTAG_TDI	I	+3V3	
2	JTAG_TDO	I	+3V3	
3	JTAG_TCK	I	+3V3	
4	JTAG_TRST#	O	+3V3	
5	JTAG_TMS	I	+3V3	
6	TP11	-	-	

3.9. Analog IO

The Analog outputs are implemented as Pulse Width Modulate (PWM) signals feeding discrete RC filters with a time constant of 3.3ms.

The Analog inputs are directly connected to the GPIO breakout area.

3.9.1 Analog IO (X14)

Type: 2x8Pin Header Male, 2.54mm

Pin Nr.	Signal Name	SODIMM Pin Number	IO Type	Voltage	Pullup/Pulldown
1	ANALOG_IN0	8	I	+3V3	
2	AUDIO_AGND		PWR		
3	ANALOG_IN1	6	I	+3V3	
4	AUDIO_AGND		PWR		
5	ANALOG_IN2	4	I	+3V3	
6	AUDIO_AGND		PWR		
7	ANALOG_IN3	2	I	+3V3	
8	AUDIO_AGND		PWR		
9	ANALOG_OUT_D		O	+3V3	RC-filter (3.3ms)
10	GND		PWR		
11	ANALOG_OUT[1]		O	+3V3	RC-filter (3.3ms)
12	GND		PWR		
13	ANALOG_OUT_B		O	+3V3	RC-filter (3.3ms)
14	GND		PWR		
15	ANALOG_OUT_A		O	+3V3	
16	GND		PWR		

3.10. SD Card / MMC

The hardware supported card detect function is implemented. The hardware write protect feature is not.

3.10.1 SD Card / MMC (X15)

Type: SDIO-Socket

Pin Nr.	Signal Name	IO Type	Voltage	Pullup/Pulldown
1	MM_DAT_3	IO	+3V3	68k to +3V3
2	MM_CMD	I	+3V3	33k to +3V3
3	GND	PWR		
4	+3V3	PWR		
5	MM_CLK	I	+3V3	
6	GND	PWR		
7	MMDAT_0	IO	+3V3	68k to +3V3
8	MMDAT_1	IO	+3V3	68k to +3V3
9	MMDAT_2	IO	+3V3	68k to +3V3

3.11. Ethernet

On the Colibri Evaluation Board there is an RJ45 connector with integrated magnetics for 10/100Mb assembled. With Jumper JP6 different Ethernet controllers can be configured:

JP6	Active
1 - 2	DM9000E on PXA270
2 - 3	DM9000A/ASIX on other modules

Ethernet PHY can use either current mode or voltage mode line driver technology. Current mode technology is legacy method used in 10/100 BASE-T PHY, whereas voltage mode technology has gained popularity in recent times.

In future, jumper JP3 can be used to make Ethernet compatible with the voltage mode line drivers.

Jumper	Status	Function
JP3	CLOSED	Current mode Ethernet PHY
JP3	OPEN	Voltage mode Ethernet PHY

3.11.1 Ethernet (X17)

Type: RJ-45

Pin	Signal Name	SODIMM Pin Number	I/O Type	Voltage	Pull-up/Pull-down
1	ETH_TX0_P	189	O	+3.3V	50R to ETH_AVCC
2	ETH_TX0_N	187	O	+3.3V	50R to ETH_AVCC
3	ETH_RXI_P	195	I	+3.3V	
4	ETH_AVCC (CT_TXD)		PWR		
5	ETH_AGND (CT_RXD)		PWR		
6	ETH_RXI_N	193	I	+3.3V	
7	NC				
8	SHIELD				
9	+3.3V		PWR		
10	ETH_LINK_ACT	183	I	+3.3V	
11	ETH_SPEED	185	I	+3.3V	
12	+3.3V		PWR		
S1	SHIELD				
S2	SHIELD				

3.12. LEDs / Switches

These signals are available on connector X21. They can be directly connected to the GPIO breakout connectors or to additional custom specific hardware.

Please note that the buttons and switches are not debounced.

3.12.1 LED/Switches (X21)

Type: 2x6 Pin Female, 2.54mm

Pin Nr.	Signal Name	IO Type	Voltage	Pullup/Pulldown
1	SWITCH_1	O	+3V3	100k to GND
2	LED_1	I	+3V3	100k to GND
3	SWITCH_2	O	+3V3	100k to GND
4	LED_2	I	+3V3	100k to GND
5	SWITCH_3	O	+3V3	100k to GND
6	LED_3	I	+3V3	100k to GND
7	SWITCH_4	O	+3V3	100k to GND
8	LED_4	I	+3V3	100k to GND
9	BUTTON_1	O		10k to GND
10	+3V3	PWR	+3V3	
11	BUTTON_2	O		10k to GND
12	GND	PWR	+3V3	

3.13. Parallel Camera Interface (X22)

The Parallel Camera Interface (previously known as the Quick Capture Interface (CIF)) on connector X22 is intended for applications requiring image capture capability from CMOS or CDD image sensors. This interface supports a wide variety of operating modes, data widths, formats, and clocking schemes. For details please see the relevant Colibri module datasheet.

Please note that most of the signals for this interface which are available on the connector X22 are configured as alternate functions when using the factory settings (e.g. jumper settings and the Toradex supplied Windows CE/Embedded Compact image). The user is responsible for reconfiguring these default settings prior to using the interface, which may involve both hardware and software configuration.

On Colibri Evaluation Board V3.2, the pin-out of the connector X22 has been modified and a table with the new pin-out has been added to the datasheet. The modification has been done in-order to maintain the compatibility of the Parallel Camera Interface across Colibri and Apalis family carrier boards.

Please note that Colibri Evaluation Board V3.2 connector X22 pin-out is no more compatible with Colibri Evaluation Board V3.1 and Analogue Camera Module V1.1 (ACM). Special attention need to be paid on the PCB revision while using the Parallel Camera Interface.

Following table shows the connector X22 pin-out for ***Colibri Evaluation Board V3.2***

Type: 2x12Pin Header Male, 2.54mm

Pin Nr.	Signal Name	SODIMM Pin Number	IO Type	Voltage	Pullup/Pulldown
1	+3.3		PWR		
2	+3.3		PWR		
3	CIF_MCLK	75	IO	+3V3	
4	CIF_PCLK	96	IO	+3V3	
5	CIF_HSYNC	94	IO	+3V3	
6	CIF_VSYNC	81	IO	+3V3	100K to GND
7	CIF_D_2	101	IO	+3V3	
8	CIF_D_3	103	IO	+3V3	
9	CIF_D_4	79	IO	+3V3	
10	CIF_D_5	97	IO	+3V3	
11	CIF_D_6	67	IO	+3V3	
12	CIF_D_7	59	IO	+3V3	
13	CIF_D_8	85	IO	+3V3	
14	CIF_D_9	65	IO	+3V3	
15	I2C_SCL	196	IO	+3V3	4k7 to +3V3
16	I2C_SDA	194	IO	+3V3	4k7 to +3V3
17	CIF_D_0	71	IO	+3V3	
18	CIF_D_1	98	IO	+3V3	100K to +3.3V
19	GND		PWR		
20	GND		PWR		
21	CIF_D_10	69	IO	+3V3	100K to +3.3V
22	CIF_D_11	77	IO	+3V3	
23	+3.3V		PWR		
24	+5V		PWR		

For customers using ***Colibri Evaluation Board V3.1***, following table shows the connector X22 pin-out.

Type: 2x12Pin Header Male, 2.54mm

Pin Nr.	Signal Name	SODIMM Pin Number	IO Type	Voltage	Pullup/Pulldown
1	+3.3		PWR		
2	+3.3		PWR		
3	CIF_MCLK	75	IO	+3V3	
4	CIF_PCLK	96	IO	+3V3	
5	CIF_HSYNC	94	IO	+3V3	
6	CIF_VSYNC	81	IO	+3V3	100K to GND
7	CIF_D_0	71	IO	+3V3	
8	CIF_D_1	98	IO	+3V3	
9	CIF_D_2	101	IO	+3V3	
10	CIF_D_3	103	IO	+3V3	
11	CIF_D_4	79	IO	+3V3	
12	CIF_D_5	97	IO	+3V3	
13	CIF_D_6	67	IO	+3V3	
14	CIF_D_7	59	IO	+3V3	
15	I2C_SCL	196	IO	+3V3	4k7 to +3V3
16	I2C_SDA	194	IO	+3V3	4k7 to +3V3
17	CIF_D_8	85	IO	+3V3	
18	CIF_D_9	65	IO	+3V3	100K to +3.3V
19	GND		PWR		
20	GND		PWR		
21	CIF_D_10	69	IO	+3V3	100K to +3.3V
22	CIF_D_11	77	IO	+3V3	
23	+3.3V		PWR		
24	+5V		PWR		

Unlike Colibri Evaluation Board V3.1 connector X22, which was pin-to-pin compatible with Analogue Camera Module V1.1, the X22 connector of Colibri Evaluation Board V3.2 is not compatible, so a custom connector will be required to interface Colibri Evaluation Board V3.2 with the Analogue Camera Module V1.1 (ACM).

3.14. 2xRS232 (X25)

Type: 2 x DSUB9 Male stacked

Pin Nr.	Signal Name	Remarks
U1	RS232_U_DCD	A dedicated pin is not available on the Colibri standard pin-out. Signal is only connected to test-point (TP3).
U2	RS232_U_RXD	
U3	RS232_U_TXD	
U4	RS232_U_DTR	A dedicated pin is not available on the Colibri standard pin-out. Signal is pulled-up to 3.3V using 100K resistor.
U5	GND	
U6	RS232_U_DSR	A dedicated pin is not available on the Colibri standard pin-out. Signal is only connected to test-point (TP5).
U7	RS232_U_RTS	
U8	RS232_U_CTS	
U9	RS232_U_RI	A dedicated pin is not available on the Colibri standard pin-out. Signal is only connected to test-point (TP4).
L1	RS232_L_DCD	
L2	RS232_L_RXD	
L3	RS232_LTXD	
L4	RS232_L_DTR	
L5	GND	
L6	RS232_L_DSR	
L7	RS232_L_RTS	
L8	RS232_L_CTS	
L9	RS232_L_RI	

3.15. Audio

The stacked connector offers standard jacks for active loudspeakers or headphones, for line-in and microphone input.

3.15.1 3xAudio Jack (X26)

Type: 3 x 3.5mm Jack stacked

Pin Nr.	Signal Name	SODIMM Pin Number	IO Type	Voltage	Pullup/Pulldown
1	AUDIO_AGND		PWR		
2	AUDIO_AVCC		Not connected		
3	AUDIO_AVCC		Not connected		
4	MIC_IN	1	I	+3V3	
5	MIC_IN	1	I	+3V3	
22	HEADPHONE_AC_R	17	O	+3V3	
23	HEADPHONE_AC_R	17	O	+3V3	
24	HEADPHONE_AC_L	15	O	+3V3	
25	HEADPHONE_AC_L	15	O	+3V3	
32	LINEIN_R	7	I	+3V3	
33	LINEIN_R	7	I	+3V3	
34	LINEIN_L	5	I	+3V3	
35	LINEIN_L	5	I	+3V3	

3.16. USB to Serial Connector

The Colibri Evaluation Board features a built in USB to Serial UART converter (FTDI FT232RL) which can be used to interface with the serial debug Full Function (FF) UART via the USB Type B connector X27.
By changing the position of the Jumpers JP17, JP19, JP20 and JP21, it is possible to route the signals TXD, RXD, RTS and CTS of the FF UART interface to the connector X27 instead of the connector X25 (bottom):

JP17, JP19, JP20, JP21	Active
1 - 2	Connector X25
2 - 3	Connector X27

3.16.1 USB to Serial Connector (X27)

Type: USB Type B

Pin Nr.	Signal Name
1	5V_USB_D
2	USBD_N
3	USBD_P
4	GND

3.17. USB

The Colibri Evaluation Board integrates a 4 port USB Hub (SMSC USB2514B-AEZC) to provide 4x USB 2.0 host interfaces, as well as a USB OTG Micro-AB (X30) shared with a USB Type B connector (X29) for an additional client/host interface.

For further information about the USB Hub please refer to the SMSC website.

The ID pin of the USB OTG port can be connected at the SODIMM_135 pin by inserting the Jumper JP2.

3.17.1 USB Client (X29)

Type: USB Type B

Pin Nr.	Signal Name
1	VCC_USB5
2	USBC_B_N
3	USBC_B_P
4	GND

3.17.2 USB OTG (X30)

Type: USB OTG A/B Vertical

Pin Nr.	Description
1	VCC_USB5
2	USBC_C_N
3	USBC_C_P
4	USB_ID
5	GND

3.17.3 2xUSB Host (X31)

Type: 2 x USB-Type A stacked (USB 1/2)

Pin Nr.	Signal Name
U1	VCC_USB1
U2	USB1_C_N
U3	USB1_C_P
U4	GND_USB1
L1	VCC_USB2
L2	USB2_C_N
L3	USB2_C_P
L4	GND_USB2

3.17.4 2xUSB Host (X32)

Type: 2 x USB-Type A stacked (USB 3/4)

Pin Nr.	Signal Name
U1	VCC_USB3
U2	USB3_C_N
U3	USB3_C_P
U4	GND_USB3
L1	VCC_USB4
L2	USB4_C_N

Pin Nr.	Signal Name
L3	USB4_C_P
L4	GND_USB4

3.18. Power Supply Connectors

The Colibri Evaluation Board provides two methods of supplying power to the board. The first method is using connector X33 which is a pluggable, dual pin male screw type terminal block connector. The second method is using connector X35 which is a standard 5.5mm power jack.

3.18.1 Power Supply (X33)

Type: AUK TB5102PRB-H

Pin Nr.	Signal Name
1	GND_IN
2	PWR_IN

3.18.2 Power Supply Jack (X35)

Type: DCJ20-0014TB-L

Pin Nr.	Signal Name
1	PWR_IN
2	GND_IN

3.18.3 Power OUT Jack (X37)

Type: 1x5Pin Header Male, 2.54mm, NA

Pin Nr.	Signal Name
1	+5V
2	GND
3	+3.3V
4	GND
5	V_SUPPLY_FILT

Please note that the pin number five is not regulated because it is directly connected to the Power Supply connectors.

3.19. Real-Time Clock (RTC)

The Colibri Evaluation Board uses the STMicroelectronics, M41T0M6 chip as external RTC. A battery holder (BAT1) is available on the Colibri Evaluation Board for RTC power backup. Jumper (JP23) is used for selection of the internal (on module) or external RTC:

JP23	Active
1 - 2	Internal RTC (available on Colibri Module)
2 - 3	External RTC (available on Evaluation Board)

For more details about internal RTC, please refer Colibri computer-on-module datasheet.

Supported batteries: CR2032 or similar coin cells.

4. Default Signal Mapping

The table below lists the default signal mapping (factory setting). Every row of the table shows the mapping of a Colibri pin to the function or connector on the Evaluation Board.

Legend:

Signal name:	GPIO number on the Colibri module
X8 Row A, X11 Row B	Pin number on the patch panel connector X7/X16, Colibri side (one end of the jumper)
X8 Row B, X11 Row A	Pin number on the patch panel connector X7/X16, Evaluation Board side (the other end of the jumper)
External Connector	if the signal is available on an external connector the connector's pin number is listed here
Conn. Type	lists, if a signal is level shifted between the patch panel connector X8/X11 and the external connector
Internal Function	if a signal is not directly accessible on an external connector, but is used to control an on-board function, the function is listed here. For details please refer to the schematics of the Evaluation Board.
Function	Description of the signal

4.1. Default Signal Mapping

Colibri Side of the Patch Panel				Evaluation Board Side of the Patch Panel		
Signal Name	X8 Row A	X8 Row B	Conn. Type	Internal function	External Connector	Function
SODIMM_44	13	13		VGA	X34-32 / X20-27	LCD_BIAS
SODIMM_46	23	23		VGA	X34-19 / X20-14	LCD_Green3 / LCD_D_7
SODIMM_48	25	25		VGA	X34-17 / X20-16	LCD_Green5 / LDC_D_9
SODIMM_50	27	27		VGA	X34-15 / X20-18	LCD_Green7 / /LCD_D_11
SODIMM_52	28	28		VGA	X34-27 / X20-6	LCD_Red2 / LDC_D_12
SODIMM_54	30	30		VGA	X34-26 / X20-7	LCD_Red3 / LCD_D_13
SODIMM_56	42	42		VGA	X34-28 / X20-2	LCD_PCLK_WR
SODIMM_57	33	33		VGA	X34-23 / X20-10	LCD_Red6 / LDD_D_16
SODIMM_58	18	18		VGA	X34-10 / X20-23	LCD_Blue5 / LDC_D_3
SODIMM_60	17	17		VGA	X34-11 / X20-22	LCD_Blue4 / LDC_D_2
SODIMM_61	34	34		VGA	X34-22 / X20-11	LCD_Red7 / LCD_D_17
SODIMM_62	24	24		VGA	X34-18 / X20-15	LCD_Green4 / LCD_D_8
SODIMM_64	32	32		VGA	X34-32 / X20-9	LCD_Red5 / LCD_D_15
SODIMM_66	31	31		VGA	X34-32 / X20-8	LCD_Red4 / LCD_D_14
SODIMM_68	44	44		VGA	X34-32 / X20-3	LCD_LCLK_A0
SODIMM_70	16	16		VGA	X34-32 / X20-21	LCD_Blue3 / LCD_D_1
SODIMM_71	46	46			X23-3	BL_ON
SODIMM_72	20	20		VGA	X34-8 / X20-25	LCD_Blue7 / LDC_D_5
SODIMM_74	26	26		VGA	X34-16 / X20-17	LCD_Green6 / LCD_D_10
SODIMM_76	14	14		VGA	X34-13 / X20-20	LCD_Blue2 / LCD_D_0
SODIMM_78	19	19		VGA	X34-9 / X20-24	LCD_Blue6 / LCD_D_4
SODIMM_80	21	21		VGA	X34-20 / X20-13	LCD_Green2 / LCD_D_6

Colibri Side of the Patch Panel			Evaluation Board Side of the Patch Panel		
SODIMM_82	45	45	VGA	X34-31 / X20-4	LCD_FCLK_RD
SODIMM_136	35	35	VGA	X20-47	LCD_Green2 / LCD_D_18
SODIMM_138	37	37	VGA	X20-48	LCD_Green2 / LCD_D_19
SODIMM_140	38	38	VGA	X20-45	LCD_Green2 / LCD_D_20
SODIMM_142	39	39	VGA	X20-46	LCD_Green2 / LCD_D_21
SODIMM_144	40	40	VGA	X20-43	LCD_Green2 / LCD_D_22
SODIMM_146	41	41	VGA	X20-44	LCD_Green2 / LCD_D_23
SODIMM_194	47	47		X3-A29	I2C_SDA
SODIMM_196	48	48		X3-C28	I2C_SCL

4.2. Default Signal Mapping

Colibri Side of the Patch Panel				Evaluation Board Side of the Patch Panel		
Signal Name	X11 Row B	X11 Row A	Conn. Type	Internal function	External Connector	Function
SODIMM_19	2	2			X36-4	UART_C_RXD
SODIMM_21	3	3			X36-3	UART_C_TXD
SODIMM_23	4	4	Level shifted		X25-L4	UART_A_DTR
SODIMM_25	5	5	Level shifted		X25-L8	UART_A_CTS
SODIMM_27	6	6	Level shifted		X25-L7	UART_A_RTS
SODIMM_28	27	27		Analog I/O		Analog Out B
SODIMM_29	7	7	Level shifted		X25-L6	UART_A_DSR
SODIMM_30	28	28		Analog I/O		Analog Out C
SODIMM_31	9	9	Level shifted		X25-L1	UART_A_DCD
SODIMM_32	13	13	Level shifted		X25-U8	UART_B_CTS
SODIMM_33	10	10	Level shifted		X25-L2	UART_A_D_RXD
SODIMM_34	14	14	Level shifted		X25-U7	UART_B_RTS
SODIMM_35	11	11	Level shifted		X25-L3	UART_A_D_TXD
SODIMM_36	16	16	Level shifted		X25-U2	UART_B_RXD
SODIMM_37	12	12	Level shifted		X25-L9	UART_A_RI
SODIMM_38	17	17	Level shifted		X25-U3	UART_B_TXD
SODIMM_43	18	18			X15-10	MM_CD
SODIMM_47	19	19			X15-5	MM_CLK
SODIMM_49	23	23			X15-8	MM_DAT_1
SODIMM_51	24	24			X15-9	MM_DAT_2
SODIMM_53	25	25			X15-1	MM_DAT_3
SODIMM_59	26	26		Analog I/O		Analog Out A
SODIMM_67	30	30		Analog I/O		Analog Out D
SODIMM_73	31	31		CAN		CAN_INT#
SODIMM_86	32	32			X3-A30	SSP_FRM
SODIMM_88	3	3			X3-C29	SSP_SCLK
SODIMM_90	34	34			X3-C30	SSP_RXD
SODIMM_92	35	35			X3-B30	SSP_TXD

Colibri Side of the Patch Panel			Evaluation Board Side of the Patch Panel			
SODIMM_105	37	37			X3-A27	EXT_CS_0#
SODIMM_106	39	39			X3-C27	EXT_CS_2#
SODIMM_107	38	38			X3-B26	EXT_CS_1#
SODIMM_127	42	42			X3-C32	EXT_IO_2
SODIMM_129	47	47		USB Host		USB_PE#
SODIMM_131	48	48		USB Host		USB_OC#
SODIMM_133	41	41			X3-A32	EXT_IO_1
SODIMM_135	40	40			X3-C31	EXT_IO_0
SODIMM_137	49	49	Level shifted		X29-1	USB_C_DET
SODIMM_190	20	20			X15-2	MM_CMD
SODIMM_192	21	21			X15-7	MM_DAT_0

5. PCB Revision

Revision history of the Colibri Evaluation Board is as follows:

- Colibri Evaluation Board V3.0 : Initial Design
- Colibri Evaluation Board V3.1 : Production Release
- Colibri Evaluation Board V3.2 : Production Release

From the version 3.1 to 3.2 the following changes have been made:

- Parallel Camera Interface connector X22 pin-out has been updated to maintain the compatibility with the Apalis Evaluation Board.
- Jumper JP3 has been added to make Ethernet compatible with the future voltage mode line drivers.
- Connector X38 and Jumpers JP4 & JP5 has been added to facilitate testing of the on-module CAN interface (available on Colibri VFxx and Colibri iMX6).
- Jumper JP20 and JP21 has been added to allow RTS and CTS signals of the FF UART to be routed to either connector X27 or connector X25.

6. RoHS Compliance

The Colibri Evaluation Board baseboard complies with the European Union's Directive 2002/95/EC: "Restrictions of Hazardous Substances".

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